Sub c4 Be Cncl

38. (new) An optical-quality polarized part according to claim 1 wherein the polarizer is a wafer comprising a material selected from the group consisting of polycarbonate, poly(methyl methacrylate), polystyrene, cellulose acetate butyrate (CAB), cellulose acetate, and cellulose triacetate.

REMARKS

Applicants respectfully request reconsideration of this application in view of the foregoing amendments to the specification and claims and the following comments.

Claims 1-12 and 31-35 were examined in Office Action. Claims 13-30 have been canceled, without prejudice, as being drawn to non-elected Invention II. Applicants reserve the right to file and prosecute a divisional application containing claims drawn to that non-elected invention.

By this Amendment, Applicants have added new claims 36-38 to the application. Thus, twenty claims are presented for reconsideration, including original claims 1-12 and 31-35 and new claims 36-38.

The Office Action raised an objection to the drawings and an objection to claim 10, and it also rejected all of claims 1-12 and 31-35. These objections and claim rejections, and newly added claims 36-38, are discussed below.

The Objection to the Drawings

In paragraph 3 of the Office Action mailed September 5, 2002, the drawings were objected to as allegedly failing of comply with 37 C.F.R. § 1.84(p)(5). Specifically, the Examiner alleged that the drawings failed to include the reference numeral 100. In response, Applicants note that FIG. 1 from the originally filed application does, in fact, include the reference numeral 100. This is indicated by a hand-drawn red circle on the enclosed photocopy of that drawing.

The Informality Objection to Claim 10

In paragraph 4 of the Office Action, claim 10 was objected to because "the reaction product" lacks antecedent basis. In response, Applicants have amended claim 10 to change "the reaction product" to "a reaction product." This objection to claim 10 should now be withdrawn.

The Rejections of Claims 1-12 and 31-35 Under 35 U.S.C. § 103(a)

In paragraphs 5-7 of the Office Action, claims 1, 3, 5-12, and 31-35 were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 4,873,029 to Blum (the "Blum patent") in view of U.S. Patent No. 6,127,505 to Slagel (the "Slagel patent"), and claims 2 and 4 were similarly rejected as allegedly unpatentable over the Blum and Slagel patents in further view of U.S. Patent No. 6,113,811 to Kausch et al. (the "Kausch patent"). For the reasons set forth below, Applicants respectfully traverse these rejections.

The Invention

Before addressing the rejections of claims under 35 U.S.C. § 103(a), it will be helpful to briefly describe Applicants' invention. The invention is embodied in an optical-quality polarized part incorporating: (1) an optical construct (e.g., a lens substrate) including a high impact polyurethane-based optical material, and (2) a polarizer integrally bonded to the optical construct.

In optional, more detailed features of the invention, the optical construct can include a polyurethane prepolymer reacted with a diamine curing agent, and it optionally can further include a dye or colorant, a stabilizer, or a stiffener. It also can include up to about 12 molar percent trimethylol propane. The prepolymer and diamine curing agent can have an equivalent ratio of about 0.9 to 1.1 NH_2/1/0 NCO. Most preferably, the optical construct can include a reaction product of: (a) a polyurethane prepolymer prepared by reacting methylenebis(cyclohexyl isocyanate) with an OH-containing intermediate having a weight average

molecular weight between about 500 and 1200, selected from the group consisting of polyester glycols, polyether glycols, and mixtures thereof, in an equivalent ratio of 2.5 to 4/0 NCO/1/0 OH, and (b) an aromatic diamine curing agent in an equivalent ratio of about 0.9 to 1.1 NH_2/1.0 NCO.

In other optional, more detailed features of the invention, the polarizer can include a polyethylene terephthalate film, or it can be in the form of a wafer or can include at least one layer supporting a polyvinyl alcohol film. Further, the optical-quality polarized part can further include a hard coating integrally bonded to the optical construct and/or the polarizer. Yet further, the polarizer can be bonded to the optical construct, at or near the optical construct's front surface, after the optical construct has been formed. It also can be pre-treated to enhance the bonding.

In yet other optional, more detailed features of the invention, the polarizer preferably has a thickness of less than 1 mm or, in the case of single-layer polarizer, less than 0.2 mm. Further, the polarizer can be a wafer incorporating a thermoplastic material selected from the group consisting of polycarbonate, poly(methyl methacrylate), polystyrene, cellulose acetate butyrate (CAB), cellulose acetate, and cellulose triacetate.

The Rejection of Independent Claim 1

Independent claim 1 defines an optical-quality polarized part incorporating: (1) an optical construct comprising a high impact polyurethane-based optical material, and (2) a polarizer integrally bonded to the optical construct.

In rejecting independent claim 1, the Examiner asserted that the Blum patent discloses all of the features of claim 1, but "does not disclose an optical construct comprising a high impact polyurethane-based optical material." Nevertheless, the Examiner asserted that the Slagel patent makes up for this deficiency of the Blum patent by disclosing an optically clear high impact polyurethane-based optical material, and further asserted that it would have been obvious to one having ordinary skill in the art to have used Slagel's material to make Blum's optical

construct. The stated motivation for making this substitution would have been to provide impact resistance.

Applicants respectfully disagree. Substituting a high impact polyurethane-based optical material for Blum's CR-39 material (allyl diglycol carbonate) is not a straightforward task. No showing has been made that those having ordinary skill in the art would have been able to make an optical-quality polarized part incorporating an optical construct of such a material, integrally bonded to a polarizer.

As discussed at length in the Background of the Invention section of the application, the inventors were, in fact, motivated to improve the impact resistance of optical lenses like those disclosed in the cited Blum patent, by substituting a high-impact, polyurethane-based material for CR-39 as the optical construct. However, initial efforts to make such a modified optical lens led to significant problems. These efforts were summarized as follows:

> " . . . In early attempts to combine their modified high impact polymeric material [i.e., modified polyurethane-based material of the Slagel patent] with standard polyvinyl alcohol (PVA) polarized film using conventional techniques, the film was consistently displaced and bent out of shape during the introduction of the material. Thus, initial testing revealed that a substitution of their high impact material for standard lens thermoset resin materials and conventional manufacturing processes was not possible."
>
> "Analysis of the initial testing further revealed that the properties of their modified high impact polymeric material greatly contributed to the inventors' failure to incorporate it into an improved optical-quality, polarized plastic part. Briefly, casting of polarized lenses and other eyewear requires controlled and reproducible positioning of the film or supported polarizer within the solidifying polymer. Gasket designs and

certain conventional filling techniques typically help to control the positioning of the film during standard lens casting. It is not uncommon to spend 10 to 15 seconds filling the assembly with resin to ensure even flow and controlled distribution of the resin around the polarizer layer. However, their modified high impact polymeric material solidifies more quickly than standard thermoset resins (approximately 30 seconds rather than several hours). Thus, standard PVA polarized film was consistently displaced and bent out of shape during the introduction of the material due, at least in part, to the quick setting time of the material."

"In a similar manner, the polarization or other essential physical properties of standard polarizing film can be compromised by the heat of the polymer's solidification process or by reaction with the monomers of the pre-mix. The modified high impact polymeric material creates considerable heat within the mold assembly during its normal, exothermic curing process. This can soften the polarizer or supporting layers, causing further displacement of the polarizing film. Depending on the polarizers or polarizing materials used, this heat could also change the color or decrease the efficiency of a polarizer. Organic dyes used as polarizers would be especially susceptible to this type of damage."

"Thus, the inventors recognized that existing manufacturing processes suggested that high impact polyurethane-based material could not be used to effect an optical-quality plastic part due to the fundamental difficulty of handling the fast-reacting modified high impact polymeric material, in combination with the more demanding process of reproducibly positioning a polarizer within any optical construct, while maintaining the optical and mechanical performance of the part."

See, Applicants' specification, page 4, line 8, – page 5, line 20.

Thus, the simple substitution of the high impact polyurethane-based material of the Slagel patent for the CR-39 material of the lens substrate of the Blum patent would lead to two significant problems: (1) displacement of the polarizer within the mold; and (2) heat damage to the polarizer due to the rapid polymerization reaction. No reference has been cited by the Examiner teaching how these problems could be overcome. Applicants are the first to have disclosed how to overcome these problems to provide an optical-quality polarized part incorporating a polarizer integrally bonded to an optical construct of high impact polyurethane-based optical material.

Another reason why the Examiner is wrong in asserting it would have been obvious to have substituted a high impact polyurethane-based material for the CR-39 material of the lens substrate of the Blum patent relates to the requirement for an integral bond between the lens substrate and the polarizing wafer. In Blum's lens assembly, the lens substrate and the adjacent surface of the polarizing wafer *both* are formed of the same CR-39 material. This similarity of materials greatly facilitates an integral bonding of the polarizing wafer to the lens substrate. Substituting a high impact polyurethane-based material for the CR-39 material of Blum's lens substrate, however, would cause the lens substrate and the adjacent surface of the polarizing wafer to be chemically quite dissimilar. Because of this dissimilarity, persons skilled in the art would not have expected an integral bond between the two to have been achievable.

For these reasons, the cited Blum and Slagel patents, together, fail to teach those having ordinary skill in the art how to make an optical-quality polarized part incorporating a polarizer integrally bonded to an optical construct formed of a high impact polyurethane-based optical material. Accordingly, the rejection of independent claim 1 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

The Rejection of Dependent Claims 2-12 and 31-35

Original claims 2-12 and 31-35 all depend from independent claim 1, adding structural features that more particularly define the invention. These claims are discussed in groups below.

Dependent Claims 2 and 4

Claims 2 and 4 both depend from independent claim 1 and more particularly define the polarizer to comprise "a polyethylene terephthalate [PET] film" (claim 2) or "at least one layer supporting a polyvinyl alcohol [PVA] film" (claim 4). These two claims were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over the Blum patent in view of the Slagel patent and further in view of the Kausch patent.

The Kausch patent fails to make up for the deficiencies of the Blum and Slagel patents, discussed above in connection with independent claim 1. The three patents, together, fail to teach those having ordinary skill in the art how to make an optical-quality polarized part incorporating a PET or PVA polarizer integrally bonded to an optical construct formed of a high impact polyurethane-based optical material. Accordingly, the rejection of claims 2 and 4 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

Dependent Claims 3 and 5-12

Claims 3 and 5-12 all depend from independent claim 1 and more particularly define the polarizer to comprise a wafer (claim 3), more particularly define the optical construct to be a lens substrate (claim 5), more particularly define the nature of the high impact polyurethane-based optical material (claims 6-10), or define the polarized part to further include a hard coating integrally bonded either to the optical construct (claim 11) or to the polarizer (claim 12). These claims all were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over the Blum patent in view of the Slagel patent.

The cited Blum and Slagel patents, together, fail to teach those having ordinary skill in the art how to make an optical-quality polarized part as defined in parent claim 1 and further incorporating the features defined in dependent claims 3 and 5-12. Accordingly, the rejection of claims 3 and 5-12 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

Dependent Claims 31-35

Claims 31-35 all depend from independent claim 1 and more particularly define the nature and location of the polarizer. Specifically, claim 31 defines the polarizer to include first and second sides, with the first side bonded to the optical construct. and claim 32 defines the polarizer to include first and second sides, with both sides bonded to the optical construct. Claim 33 defines the polarizer to be bonded to the optical construct after the optical construct has been formed, and claim 34 defines the optical construct to have opposing front and rear surfaces, with the polarizer bonded to the optical construct at or near the front surface. Finally, claim 35 defines the polarizer to be treated for bonding to the optical construct. These claims all were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over the Blum patent in view of the Slagel patent.

The cited Blum and Slagel patents, together, fail to teach those having ordinary skill in the art how to make an optical-quality polarized part as defined in parent claim 1 and further incorporating the features defined in dependent claims 31-35. Accordingly, the rejection of claims 31-35 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

New Claims 36-38

New claims 36-38 all depend from independent claim 1 and more particularly define nature of the polarizer. Specifically, claims 36 and 37 define the polarizer to comprise a wafer having a thickness of less than 1 mm (claim 36) or less than 0.2 mm (claim 37). Further, claim 38 defines the polarizer to comprise a material selected from the group consisting of polycarbonate, poly(methyl methacrylate), polystyrene, cellulose acetate butyrate (CAB), cellulose acetate, and cellulose triacetate.

No new matter is introduced by these new dependent claims. Support for the subject matter of claim 36 can be found at page 11, line 18, of the specification, support for the subject matter of claim 37 can be found at page 23, line 18 of the specification, and support for the subject matter of claim 38 can be found at page 12, lines 1-3.

With regard to new claims 36 and 37, the references of record, including the Blum patent, fail to teach those having ordinary skill in the art how to make an optical-quality polarized part as defined in parent claim 1, with a polarizer being in the form of a wafer having the small thicknesses defined in claims 36 and 37. The polarizer of the Blum patent is a solid, rigid part that acts as an interim back mold for solidification of liquid monomer in one portion of the part. A polarizer having the thickness specified in claims 36 and 37 would inherently be incapable of serving this function as an interim back mold. For this reason, as well as for the reasons discussed above with respect to claim 1, claims 36 and 37 define a nonobvious improvement over the references of record and should be allowed.

With regard to new claim 38, the references of record, including the Blum patent, fail to teach those having ordinary skill in the art how to make an optical-quality polarized part as defined in parent claim 1, with a polarizer comprising a material selected from the identified group defined in claim 38. These identified materials all are *thermoplastic* materials, which contrast with the *thermoset* material (CR-39) of the polarizer of the Blum patent. Thermoplastic and thermoset materials behave very differently. Thermoplastic materials require a substantially higher temperature to achieve bonding (by partial melting). At these temperatures, thermoset material can be irreparably damaged, typically by burning. Thus, a bonding process suitable for use with thermoset materials (e.g., the process disclosed in the Blum patent) is not generally suitable for use with thermoplastic materials. For these reasons, as well as for the reasons discussed above with respect to claim 1, claim 38 defines a nonobvious improvement over the references of record and should be allowed.

Other Matters

By this Amendment, Applicants have amended the Title of the Invention to correspond more directly to the invention now claimed.

Also by this Amendment, Applicants have deleted their prior claim for priority based on several prior co-pending patent applications. This claim of priority is not deemed necessary for the invention defined by claims 1-12 and 31-38.

Also by this Amendment, Applicants have corrected a misspelling in the specification of the word "led," and they have updated a number of references in the specification to several prior patent applications, which have now issued. Applicants also have clarified a statement in the specification regarding temperatures commonly encountered in thermoplastic molding and thermoset casting. The amended language now makes it clear that it is not the *mold*, but rather the *resin*, that is exposed to the specified temperatures, as the optical part is being formed in the mold. No new matter has been introduced by these amendments.

Conclusion

Applicants believe that this application should now be in condition for a favorable action. Allowance of the application is respectfully requested.

Respectfully submitted,

SHEPPARD, MULLIN, RICHTER & HAMPTON LLP

By: _____
James R. Brueggemann
Registration No. 28,286

333 South Hope Street
48th Floor
Los Angeles, California 90071
(213) 620-1780

Version With Markings to Show Changes Made

10. (amended) An optical-quality polarized part according to claim 1 wherein the high impact polyurethane-based optical material comprises [the] a reaction product of (a) a polyurethane prepolymer prepared by reaction of methylenebis(cyclohexyl isocyanate) with an OH-containing intermediate having a weight average molecular weight between about 500 and about 1,200 selected from the group consisting of polyester glycols, polyether glycols, and mixtures thereof in an equivalent ratio of 2.5 to 4.0 NCO/1.0 OH and (b) an aromatic diamine curing agent in an equivalent ratio of about 0.9 to 1.1 NH_2/1.0 NCO.

36. (new) An optical-quality polarized part according to claim 1 wherein the polarizer has a thickness of less than 1 mm.

37. (new) An optical-quality polarized part according to claim 1 wherein the polarizer has a thickness of less than 0.2 mm.

38. (new) An optical-quality polarized part according to claim 1 wherein the polarizer is a wafer comprising a material selected from the group consisting of polycarbonate, poly(methyl methacrylate), polystyrene, cellulose acetate butyrate (CAB), cellulose acetate, and cellulose triacetate.